

Statewide Quality Improvement in EMS *The MI-MEDIC Project*

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Disclosures and Conflicts

- Nothing to disclose
- No Known conflicts

Introduction

- Providing safe medication administration to pediatric patients in the out-of-hospital setting can be challenging
- Thank you Dr. Hoyle

Michigan Pediatric Error and Excellence Discovery with Simulation



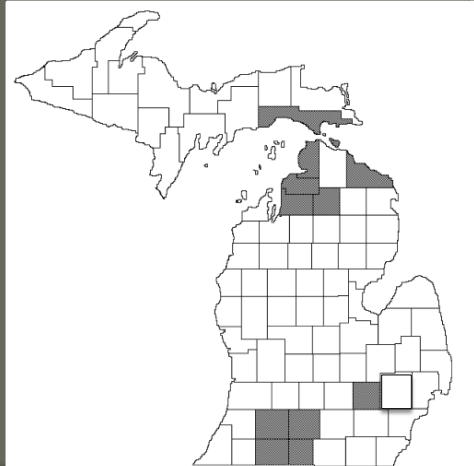
(MI-PEEDS)

MI PEEDS Goal

- Develop and conduct a series of comprehensive, realistic pediatric clinical simulations for use by EMS personnel in a mobile simulation laboratory to discover performance errors and identify exemplary individual and team performance using root cause analysis methodology

Participating EMS Agencies

- Diverse EMS Agencies
- Urban, Suburban, Rural
 - ~10% of population
- ALS Agency Type
 - County (2)
 - Private for Profit (1)
 - Private, Non-Profit (3)
 - Fire-Based (2)
- 4 of 8 CAAS Accredited



Mobile Pediatric Simulation Unit



Methods

- EMS unit assigned to project for 2 hours
- Personnel briefed, informed consent obtained
- Simulated response to peds emergency
 - Seizing, TBI infant; Child anaphylaxis; Infant arrest
 - 20-minute scenario (home & ambulance)
- Debriefing
 - Brief open discussion “hot wash”
 - Detailed video-facilitated self-assessment
 - Root cause analysis process

Potential Solutions

- “Michiganized” Broselow Tape
 - We tried but we couldn’t do it
- There’s an App for that
 - Not “Michiganized”
- Mandatory pre-med medical control contact
 - Base Hospital
 - Specialty Hospital
- Mandatory partner cross-checks
 - Challenges with non-paramedic partner
- Dosing card

LA County Peds Cards

COLOR CODE DRUG DOSES BY WEIGHT: 6-7 KG

COLOR CODE: PINK: 3-6 MONTHS; LENGTH: 59.5-66.5 CM

P I N K	NORMAL VITAL SIGNS <ul style="list-style-type: none"> Heart Rate: 100-160 Respirations: 30-60 B/P Systolic: >70 	ACLS DRUGS-- INITIAL DOSE <ul style="list-style-type: none"> Adenosine: 0.65 mg Calcium Chloride: 130 mg Epinephrine 1:10,000: 0.065 mg Amiodarone: 32 mg Sodium Bicarbonate: 6 mEq 	MEDICATIONS <ul style="list-style-type: none"> Albuterol HHN: 2.5 mg Atropine IV: 0.13 mg Dextrose 25% slow IV: 13 mL Midazolam IV/IM/IN: 0.6 mg Diphenhydramine*: 6 mg Epinephrine 1:1,000 IM: 0.065 mg Glucagon IM: 1 mg Morphine Sulfate*: 0.6 mg Naloxone IV/IM/IN: 0.6 mg Normal Saline IV Bolus: 130 mL * IV or IM 	P I N K
	DEFIBRILLATION <ul style="list-style-type: none"> Cardioversion <ul style="list-style-type: none"> 7 Joules 14 Joules 14 Joules Defibrillation <ul style="list-style-type: none"> 13 Joules 26 Joules 26 Joules 	DOPAMINE (400 mg / 5 mL) <ul style="list-style-type: none"> Add 40 mg (0.5 mL) to 100 mL bag of NS Start at 10 mcggt/minute Titrate to signs of adequate perfusion or maximum of 20 mcggt/minute 		

Pediatric Drug “Dosing” Cards Goals

- Weight-based, correlated with Broselow
- Easy to use
- Reasonably durable
- Provide doses in reasonable deliverable volumes (ml)
- Include other valuable clinical info
- Organized by condition/problem
- Easily revisable
- Affordable
- Good for adults as well



MICHIGAN
Medication Emergency Dosing
and Intervention Cards
MI-MEDIC

**Michigan Department of
Community Health**
Crime Victims, EMS & Trauma Systems Division
Based on Michigan State EMS Protocols



MI-MEDIC



- MI-MEDIC is provided by the Michigan Department of Community Health (MDCH), Division of Crime Victims, EMS, and Trauma Systems with additional support from the MDCH Office of Public Health Preparedness.
- This project was supported in part with funding from the U. S. Department of Health and Human Services (HHS) Health Resources and Services Administration (HRSA), EMS For Children State Partnership Program and from the Office of the Assistant Secretary for Preparedness and Response (ASPR) Hospital Preparedness Program (Cooperative Agreement #6U3REP030218-03-02). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of HRSA or ASPR.

Special Thanks

Maria Willoughby-Byrwa

MI-MEDIC Development

- Design format of the cards
- Translate Michigan EMS Protocols into cards
- Distribute cards for review to EMS folks
 - Format, content, accuracy
- Revise cards based on feedback
- Distribute cards for “final” review
- Make “final” revisions based on review
- Produce cards
- Enabling State Protocol for field use
- Distribute cards

MI-MEDIC Distribution

- One per ALS unit
- One per ALS Agency
 - Additional cards for larger agencies
- Three per ALS Training Program
- Two per hospital
- One per MCA
- Additional/Replacement cards will be available for purchase from printer

MI-MEDIC Reviewers

- Paramedics
- State EMS Officials
- EMS Instructors
- Nurses
 - Peds, PICU, EM, Flight
- Physicians
 - Peds, EM, Peds EM
- Pharmacists
 - Peds and EM
- ~~Members of Al-Qaeda~~

MI-MEDIC Instructions

- **Pediatric Patients (≤ 14 years old)**
 - Determine proper card to use (see back)
 - Select desired medication or intervention
 - Assure medication concentration is as specified
 - Administer volume of medication as directed
- **Adult Patients (> 14 years old) – Black Cards**
 - Select desired medication or intervention
 - Assure medication concentration is as specified
 - Administer volume of medication as directed
- Some medications should be diluted as described.

MI-MEDIC Instructions


- When possible, confirm medication dose and volume to be delivered with colleague
- Contact Medical Control for questions or concerns
- Note: Protocols are dynamic and regularly change. EMS personnel must be familiar with the most current set of approved protocols. More recent protocol revisions may supersede the information on these cards.

MI-MEDIC Instructions

Determining Proper Pediatric Card


Select the proper pediatric card to be used based on the following order:

1. If patient's actual weight is known, use card for that weight (do not confuse pounds and kilograms)
2. If patient's weight is not known, use approved length-based pediatric resuscitation tape to determine color of card
 - Measure from top of head to bottom of heel
3. If resuscitation tape not available, use patient's age to determine color of card
 - Estimate age if not known






8-9 kg (17-20 lbs) / 7-10 Months (Red)


CARDIAC RESUSCITATION



Resuscitation Medication ¹	Dose	Volume
Epinephrine 1:10,000 (1mg/10mL prefill) q 3-5 min for arrest/brady ⁵	0.1 mg	1 mL
Amiodarone (150mg/3mL) for shock resistant V-Fib	50 mg	1 mL
*Lidocaine (100mg/5mL) for wide-complex tachycardia	10 mg	0.5 mL
Atropine (1 mg/10mL) for bradycardia unresponsive to Epi ⁵	0.2 mg	2 mL
*Adenosine ³ (6mg/2mL) 1 st Dose (Diluted) ⁴ for SVT ³	1 mg	1 mL ⁴
*Adenosine ³ (6mg/2mL) 2 nd Dose (Diluted) ⁴ for SVT ³	2 mg	2 mL ⁴
Electrical Therapy	Initial ²	Repeat ²
Defibrillation (Prefer ped pads/Adult pads anterior/posterior)	20 J	40 J
*Synchronized Cardioversion ³ for unstable tachycardias	10 J	20 J
Equipment	OPA: 50mm NPA: 14F BVM: Infant Laryngoscope: 1 (straight) ET Tube: 3.0 (cuffed) ET Depth: 11 cm <u>No ETI unless unable to ventilate</u>	
Fluid Bolus	Normal Saline 170 mL IV/IO – May repeat x1 PRN (170 mL x1)	
*CONTACT MEDICAL CONTROL ¹ Must confirm medication concentration is as specified ² May adjust to closest available energy setting ³ SVT usually has HR >220 ⁴ Dilute 2 ml of Adenosine with 4 mL NSS to produce 1 mg/mL ⁵ CPR if HR<60 after O ₂		

<div><div>8-9 kg (17-20 lbs) / 7-10 Months (Red)</div><div>CONDITIONS / MEDICATIONS</div></div> <div></div>						
Assessment	Normal Vitals: HR: 100-180, RR: 25-35, SBP: 70-110 Development: (9 months) Sits steady, creeps or crawls. Holds objects in both hands, bangs together.					
Condition	Medication ¹	Dose	Volume	Drug ¹	Dose	Volume
Bronchospasm Anaphylaxis	Albuterol Neb (2.5 mg/3 mL) +/- *Ipratropium Bromide (0.5 mg/2.5 mL) if wheezing	2.5 mg +/- 0.25 mg	3 mL +/- 1.25 mL*	Epinephrine 1:1000 IM (1 mg/1 mL) <u>or</u> 1 EpiPen Jr IM	0.1 mg	0.1 mL IM ⁵
	Diphenhydramine IM/IV/IO (50 mg/mL) Dilute with 4 mL NSS = 10 mg/mL ⁴	10 mg	1 mL ² (diluted)	Solumedrol IV/IO (125 mg/2 mL) Dilute with 3 mL NSS = 25 mg/mL	17.5 mg	0.7 mL ² (diluted)
Seizure	Midazolam IM (5 mg/1 mL) Give 1 st if no IV	1 mg	0.2 mL IM	*Diazepam PR (10 mg/2 mL)	4 mg	0.8 mL PR
	*Midazolam IV slow (5 mg/1 mL) Dilute with 4 mL NSS = 1 mg/mL	0.5 mg	0.5 mL ² (diluted)	*Diazepam IV slow (10 mg/2 mL) Dilute with 8 mL NSS = 1 mg/mL	0.8 mg	0.8 mL ² (diluted)
Hypoglycemia (<40 mg/dL)	Dextrose 25% Slow IV Dilute D50 1:1 with NSS	4.25 g	17 mL (D25)	*Glucagon IM (1 mg/mL)	0.5 mg	0.5 mL IM
Pain Control	*Fentanyl IV (100 mcg/2 mL) Dilute with 8 mL NSS = 10 mcg/mL	10 mcg	1 mL ² (diluted)	*Morphine IV/IM/IO (10 mg/mL) Dilute with 9 mL NSS = 1 mg/1 mL	0.4 mg	0.4 mL ² (diluted)
	*Fentanyl IN (100 mcg/2 mL)	20 mcg	0.4 mL IN ³			
Narcotic OD	Naloxone IV/IM (2 mg/2 mL)	1 mg	1 mL	*Naloxone IN (2 mg/2 mL)	1 mg	1 mL ³
Fluid Bolus	Normal Saline 170 mL IV/IO – May repeat x1 PRN (170 mL x1)					
*Per local MCA protocol ¹ Must confirm medication concentration is as specified ² Volume after dilution with Normal Saline ³ Divide dose equally between both nostrils ⁴ For anaphylaxis only ⁵ For severe symptoms only						




Adult / >14 Years (Black)


CARDIAC RESUSCITATION


<u>Resuscitation Medication</u> ¹	<u>Dose</u>	<u>Volume</u>
Epinephrine 1:10,000 (1mg/10mL prefill) IV/IO q 3-5 min for arrest	1 mg	10 mL
*Vasopressin (20 units/mL) IV/IO may give in place of 2 nd Epi dose	40 units	2 mL
Amiodarone (150mg/3mL) IV/IO for shock resistant V-Fib	300 mg	6 mL
*Lidocaine (100mg/5mL) IV for stable wide-complex tachycardia	100 mg	5 mL
*Amiodarone ² (150 mg/3mL) IV for stable wide complex tachy	150 mg	100 mL²
Atropine (1 mg/10mL) IV/IO for bradycardia, q 3-5 min to 3 mg max	0.5 mg	5 mL
Adenosine (6mg/2mL) IV – 1 st Dose ⁴ (10 mL NSS flush) for SVT	6 mg	2 mL⁴
<u>Electrical Therapy</u>	<u>Initial</u> ³	<u>Repeat</u> ³
V-Fib or Pulseless V-Tach: Defibrillation	120-200 J	≥120-200 J
Unstable, reg wide tachy: Synchronized Cardioversion	100 J	200 J
Unstable, irregular tachy: Synchronized Cardioversion	120-200 J	≥120-200 J
<u>Fluid Bolus</u>	Normal Saline 1000 mL, repeat PRN	

¹Per local MCA protocol
 ²Must confirm med concentration is as specified
 ³Add to 100 mL NSS, run over 10 minutes
 ⁴Based on biphasic, use manufacture's recommended energy
 ⁵Double for 2nd dose



ADULT / >14 Years (Black)

CONDITIONS / MEDICATIONS



Assessment	Normal Vitals: HR: 60-100, RR: 12-20, SBP: 100-140,					
Condition	Medication ¹	Dose	Volume	Drug ¹	Dose	Volume
Respiratory Distress with Wheezing or Anaphylaxis	Albuterol Neb (2.5 mg/3 mL) +/- *Ipratropium Bromide (0.5 mg/2.5 mL) if wheezing	2.5 mg +/- 0.5 mg	3 mL +/- 2.5 mL*	Epinephrine 1:1000 IM (1 mg/1 mL) <u>or</u> 1 EpiPen (adult) IM	0.3 mg	0.3 mL IM ⁵
	Diphenhydramine ⁴ IM/IV/IO (50 mg/mL)	50 mg	1 mL ⁴	Solumedrol IV/IO (125 mg/2 mL)	125 mg	2 mL
Seizure	Midazolam IM (5 mg/1 mL) Give 1 st if no IV	10 mg	2 mL IM	*Diazepam PR (10 mg/2 mL)	3 mg	0.6 mL PR
	*Midazolam IV slow (5 mg/1 mL) Dilute with 4 mL NSS = 1 mg/mL	5 mg	5 mL ² (diluted)	*Diazepam IV slow until seizure stops (10 mg/2 mL)	10 mg	2 mL
Hypoglycemia	Dextrose 50% Slow IV	25 mL	50 mL (D50)	Glucagon IM (1 mg/mL)	1 mg	1 mL IM
Pain Control	*Fentanyl IV/IO/IM (100 mcg/2 mL). Dilute with 8 mL NSS = 10 mcg/mL	100 mcg	10 mL ² (diluted)	*Morphine IV/IO (10 mg/mL) Dilute with 9 mL NSS = 1 mg/1 mL	2-5 mg	2-5 mL ² (diluted)
	*Fentanyl IN (100 mcg/2 mL)	200 mcg	2 mL IN	*Morphine IM (10 mg/mL)	2-5 mg	0.2-0.5 mL IM
Narcotic OD	Naloxone IV/IM (2 mg/2 mL)	2 mg	2 mL	*Naloxone IN (2 mg/2 mL)	2 mg	2 mL
Fluid Bolus	Normal Saline 1000 mL IV/IO – May repeat PRN (1000 mL x1)					

¹Per local MCA protocol

¹Must confirm medication concentration is as specified

²Volume after dilution with Normal Saline

⁴For anaphylaxis only

⁵For severe symptoms only

Medication Shortages

- Single card that will have the replacement medication(s)
- Each row will represent a weight group
- Can be added and removed to the set of cards

Coming to an EMS system near you soon.....

- Questions (or Corrections) or Suggestions
 - MI-MEDIC@med.wmich.edu